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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/734,073

12/12/2003

Raymond L. Degner

015290-795

8903

7590 07/31/2009
BUCHANAN INGERSOLL PC
(INCLUDING BURNS, DOAN, SWECKER & MATHIS)
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313-1404

EXAMINER

KERNS, KEVIN P

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

07/31/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RAYMOND L. DEGNER, ERIC H. LENZ, and
LAM RESEARCH CORPORATION,
Appellants

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Control nos. 90/007,027 and 90/007,114
Patent 5,074,456
Technology Center 1700

Decided:¹ July 31, 2009

Before TERRY J. OWENS, CAROL A. SPIEGEL, and ROMULO H.
DELMENDO, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

¹ The time period for seeking judicial review begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Control nos. 90/007,027 and 90/007,114
Patent 5,074,456

Appellants appeal under 35 U.S.C. §§ 134 and 306 from a final rejection of claims 1-36 (Appeal Brief filed on August 30, 2007, hereinafter “App. Br.”; Final Office Action mailed September 27, 2006). We have jurisdiction under 35 U.S.C. §§ 6(b), 134, and 306.

We REVERSE.

STATEMENT OF THE CASE

The subject patent for reissue and under reexamination (hereinafter the “‘456 Patent”) issued to Raymond L. Degner and Eric H. Lenz on December 24, 1991 from Application 07/584,324 filed on September 18, 1990. According to a Title Report entered July 19, 2004, Lam Research Corporation is the owner of the ‘456 Patent as recorded at Reel 005455, Frame 0064 and is therefore Appellant in the reexamination proceedings (App. Br. 2).

On April 7, 2005, the Office of Patent Legal Administration merged the subject reissue application and the subject reexamination proceedings pursuant to 37 C.F.R. § 1.565 (Decision Merging Reexamination and Reissue Proceeding mailed on April 7, 2005). The first reexamination proceeding, Control 90/007,027, arose from a request for *ex parte* reexamination filed by a third party, Westerman, Hattori, Daniels & Adrian, LLP of Washington, DC. The second reexamination proceeding, Control 90/007,114, was based on a request filed by a different third party, Xycarb Ceramics, Inc. of Georgetown, TX. While Appellants state that they do “not

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

know of any other appeal or interferences which will affect or be directly affected by or have a bearing” (App. Br. 2) on our decision, it appears that the ‘456 Patent is, or has been, the subject of a stayed patent infringement action captioned *Lam Research Corp. v. Schunk Semiconductor*, Civil Action 3:03cv1335 (N.D. Cal.) (Reexamination Litigation Search Conducted filed April 4, 2006). *See* 37 C.F.R. § 41.37(c)(1)(ii) (appeal brief must identify “all other prior and pending appeals, interferences *or judicial proceedings* known to appellant”) (emphasis added).

The ‘456 Patent states that the invention relates to “a composite electrode useful in plasma reactors, such as plasma-etch and plasma-enhanced chemical vapor deposition reactors” (col. 1, ll. 8-11).

Claims 1, 3, 7, 10, 18, and 33 on appeal reads as follows:

1. An improved reactor of the type having a first electrode for supporting a substrate, an opposed electrode, and means for producing plasma therebetween, wherein the opposed electrode has one face exposed to the first electrode and an opposite face connected to an electrical source and a thermal sink, the improvement comprising an opposed electrode including (a) an electrode plate composed of a substantially pure material and having a substantially uniform thickness and (b) a support frame composed of an electrically and thermally conductive material bonded to a back face of the plate, whereby the support frame is connected to the electrical source and thermal sink and a front face of the plate which is exposed to the first electrode is substantially free from protuberances.

3. An improved reactor as in claim 1, wherein the electrode plate comprises a disk.

7. An improved reactor as in claim 3, wherein the support frame comprises a flat plate which is secured to and

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

covers substantially the entire opposite surface of the electrode disk.

10. An improved reactor as in claim 1, wherein the plate is bonded to the support frame by means of a bonding layer.

18. An electrode assembly comprising:

an electrode disk composed of a substantially pure material and having a substantially uniform thickness; and

a support ring bonded about the periphery of one face of the disk, leaving the other face substantially flat and free from protuberances, wherein the support ring is composed of an electrically and thermally conductive material.

33. A method for forming an electrode assembly including a support ring and an electrode plate, said method comprising:

bonding the support ring about the periphery of the electrode plate at elevated temperature, wherein the material of the support ring has a higher coefficient of thermal expansion than that of the electrode plate; and

allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress.

(Claims App'x 1, 2, 4, and 6.)

The Examiner relied upon the following as evidence of unpatentability (Examiner's Answer mailed September 19, 2007, hereinafter "Ans.," 3-12):

Koch

4,340,462

Jul. 20, 1982

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

Inaba (“Shigeru”) ²	JP 61-243170	Oct. 29, 1986
Yamada ³	JP 61-279672	Dec. 10, 1986
Horiuchi (“Takao”) ⁴	JP 01-204424	Aug. 17, 1989
Okazaki	EP 0 346 055 A2	Dec. 13, 1989

The Examiner rejected the claims as follows:

- I. Claims 1, 3-5, 16-19, 30, and 31 under 35 U.S.C. § 102(b) as anticipated by Takao (Ans. 3-5);
- II. Claim 2 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Koch (*id.* at 5-6);
- III. Claims 6 and 20 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Okazaki (*id.* at 6 and 9);
- IV. Claim 7, 21, and 32 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Shigeru (*id.* at 6-7, 9, and 11-12);
- V. Claims 8, 9, 22, and 23 under 35 U.S.C. § 103(a) as unpatentable over Takao (*id.* at 7 and 9-10);
- VI. Claims 10-13 and 24-27 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Yamada (*id.* at 7-8 and 10);

² Appellants and the Examiner both refer to this document as “Shigeru.” To avoid confusion, we also refer to it as “Shigeru.” We rely on and cite to the English translation of Shigeru of record.

³ We rely on and cite to the English translation of Yamada of record.

⁴ Appellants and the Examiner both refer to this document as “Takao.” To avoid confusion, we also refer to it as “Takao.” We rely on and cite to the English translation of Takao of record.

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

- VII. Claims 14, 15, 28, and 29 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao, Yamada, and Shigeru (*id.* at 8 and 10-11); and
- VIII. Claims 33-36 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Shigeru and Yamada (*id.* at 12).

ISSUES

Rejections I-III & V

The Examiner asserts that Takao describes every limitation of independent claims 1 and 18 (Ans. 3-5). With respect to the recitations “a support frame . . . bonded to a back face of the [electrode] plate” (claim 1) and “a support ring bonded about the periphery of one face of the [electrode] disk” (claim 18), the Examiner contends that “the broadest reasonable interpretation of the term ‘bonded’ would mean ‘something that fastens things together’” and “that the insulating ring coupled with the sealed ring bonds or fastens the electrode (7) to the frame (4)” (Ans. 16). *See also* Answer at 18. Rejections II, III and V are also premised on this claim construction (*id.* at 5-7, 9-10).

Appellants, on the other hand, urge that the Examiner’s claim interpretation is erroneous because “the term ‘bonded’ is used in the conventional sense to describe a joint between two surfaces and thus excludes unbonded surfaces clamped together with a mechanical structure [as described in Takao]” (App. Br. 22). According to Appellants, “the Examiner’s interpretation of ‘bonded’ is inconsistent with the usage of that term in the ‘456 patent” (*id.*).

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

Thus, a dispositive issue for Rejections I-III and V is:

Have Appellants shown reversible error in the Examiner's conclusion that the term "bonded" as recited in claims 1 and 18 reads on mechanical clamping or fastening?

Rejection IV

In rejecting claim 7, the Examiner asserts that "[t]he flat plate disclosed by Shigeru is a heat radiating backing plate (3) with gold plating, and is properly combined with Takao, as it would have been obvious to one of ordinary skill in the art . . . to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate" (Ans. 24).

Appellants, on the other hand, contend that the combination of references does not result in an apparatus including, inter alia, an electrode bonded to a support frame and that "absent impermissible hindsight, there is no motivation [or reason] to combine the sputtering target of Shigeru with the etching apparatus of Takao" (App. Br. 38, 40). Specifically, Appellants urge that, given the differences between Takao and Shigeru, the proposed modification renders Takao inoperable and, therefore, "there is no suggestion or motivation to make the proposed modification" (App. Br. 40-44).

Thus, the issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown reversible error in the Examiner's obviousness conclusion as to claim 7 because the Examiner did not

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

sufficiently establish that a person having ordinary skill in the art would have reasonably expected the proposed modification of Takao in view of Shigeru to result in an operable device?

Rejections VI & VII

For Rejections VI and VII (e.g., claim 10), the Examiner asserts that “Yamada teaches the plate is bonded to the support frame by means of a bonding layer . . . formed by soldering” and that “[i]t would have been obvious to one of ordinary skill in the art . . . to modify the process of Takao to utilize the support frame using indium in order to affix the target to the base” as taught by Yamada (citation omitted) (Ans. 7-8).

Appellants counter that the Examiner “fails to provide any showing that amorphous carbon had been used as a sputtering material or that amorphous carbon is capable of being soldered to aluminum” and that, therefore, the Examiner failed “to establish the required reasonable expectation of success” (App. Br. 48-49). Additionally, Appellants urge that “[g]iven the different uses and constructions of the Takao showerhead electrode and the Yamada sputtering target, the Examiner has not provided a proper legal basis for the obviousness rejection,” i.e., “why a person of ordinary skill in the art would have selected the isolated teachings of a soldered arrangement of Yamada and substituted it for the clamped arrangement of Takao” (App. Br. 52).

Thus, a dispositive issue is:

Have Appellants shown reversible error in the Examiner’s obviousness conclusion as to claim 10 because the Examiner failed to

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

sufficiently establish that a person having ordinary skill in the art would have had a reasonable expectation of success in modifying Takao by using Yamada's bonding layer to affix Takao's electrode (7) to body or frame (4)?

Rejection VIII

In Rejection VIII (e.g., independent claim 33), the Examiner states that "Shigeru teaches bonding the backing plate to an electrode plate (silicon dioxide) at elevated temperature (170 C), wherein the material of the electrode plate (Cu) has a higher coefficient of thermal expansion than that of the electrode plate (silicon dioxide)," thus "allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress" (Ans. 49).

Appellants, on the other hand, contend that "Shigeru fails to disclose bonding an electrode to a plate to achieve a desired stress due to differential contraction and only speculation would provide the basis for the Examiner's allegation that such pre-stress would be inherent in bonding an electrode plate to a support ring" (App. Br. 104). Appellants further argue that Yamada does not cure the deficiency in the Examiner's speculative reasoning (*id.*).

Thus, the dispositive issue is:

Have Appellants shown reversible error in the Examiner's obviousness conclusion as to claim 33 because the Examiner's reasoning is based on speculation, not facts?

FINDINGS OF FACT (“FF”)

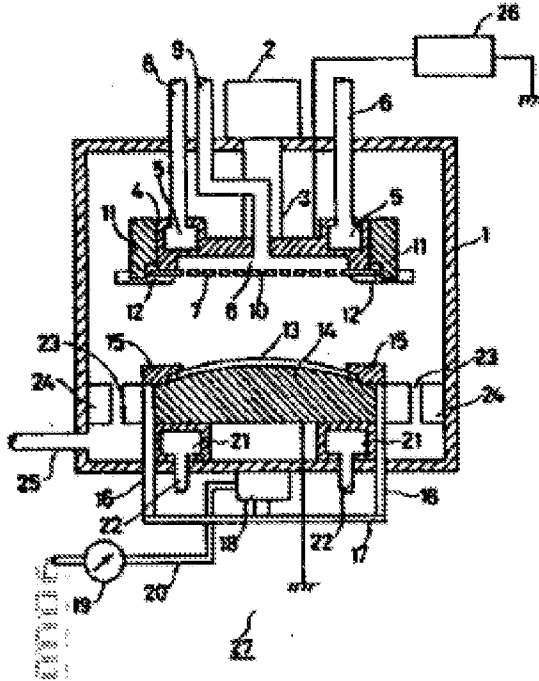
1. The ‘456 Patent describes the claimed invention as follows (col. 2, ll. 29-47; emphasis added):

According to the present invention, an electrode assembly suitable for use in a parallel plate plasma reactor comprises a plate, usually in the form of a disk, composed of a “semiconductor purity” material having a substantially uniform thickness. One face of the plate is *bonded* to a support frame composed of an electrically and thermally conductive material, leaving the other face substantially flat and free from protuberances. Usually, the support frame will be in the form of a ring which is bonded about the periphery of a plate in the form of a disk. *Preferably, a plate and support frame are bonded together with a relatively ductile bonding layer formed by brazing, soldering, or the like. The bonding material should be composed of a thermally and electrically conductive material, such as metals, conductive epoxies, or the like preferably being formed from low vapor pressure materials which will have less tendency to contaminate low pressure reactor environments.*

2. The ‘456 Patent further states (col. 5, l. 64 to col. 6, l. 5; emphasis added):

The support ring 14 may be bonded to the electrode plate 12 by any suitable process which provides the *necessary bonding strength as well as thermal and electrical characteristics*. Typically, bonding will be performed by either brazing, soldering, or use of adhesives to form a ductile bonding layer, preferably having a low vapor pressure. The ductility is desirable so that any thermal expansion mismatch between the electrode plate 12 and support ring 14 *will not result in breaking or fracturing of the bond*, or the electrode plate 12.

3. Takao Figure 1 is reproduced below:

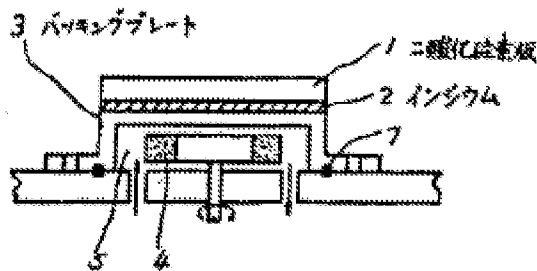


Takao's Figure 1 depicts the upper part of a reaction container (1) for etching a semiconductor wafer (13) including, inter alia, an electrode body (4) with its surface anodized with a conductive material such as aluminum, which is electrically connected to an upper electrode (7) made of amorphous carbon, a sealed ring (12) that extends from the bottom of an insulation ring (11), and a lower electrode (14) (Translation 3).

4. The Examiner's stated that Takao's description of the insulating ring (11) coupled with sealed ring (12) bonds or fastens electrode (7) to frame (4) describes the limitation of a support frame "bonded to a back face of the plate" as recited in claim 1, part (b) because persons skilled in the art would have

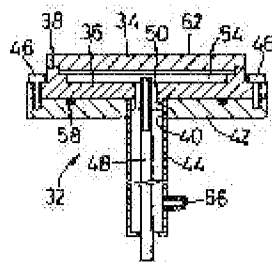
understood the term “bonded” to include physically contacting by clamping (Ans. 16).

5. Takao teaches that upper electrode (7) has a plurality of holes (1) to permit the flow of reaction gas from space (8) into reaction container (1) (Translation 3).
6. Shigeru’s figure 1 is reproduced below:



Shigeru’s figure 1 discloses a device obtained from a bonding method for a sputtering target in which a metallic oxide (silicon dioxide) target material (1) is cleaned with nitric oxide and then the metallic oxide is bonded to a heat radiant backing plate such as Cu (3), on which is deposited indium (2), using a thin film layer such as Au, Ag, or Al (Translation 1-3).

7. Yamada’s figure 3 is reproduced below:



Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

Yamada's figure depicts a lower surface of a target 34, which is attached to a target holding device 32 by soldering a solder material, such as gallium and indium, to an annular projection 38 of a fixing member 36 (Translation 3).

PRINCIPLES OF LAW

In construing claims, "it would be unreasonable for the PTO to ignore any interpretive guidance afforded by the applicant's written description[.]" *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). That is, the interpretation of the claim language must be "reasonable in light of the totality of the written description[.]" *In re Baker Hughes, Inc.*, 215 F.3d 1297, 1303 (Fed. Cir. 2000).

Anticipation

"To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

Obviousness

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

The use of a known technique for one device in another device may have been obvious if “a person of ordinary skill in the art would [have] recognize[d] that [the proposed modification] would improve [the other device] in the same way,” i.e., the improvement is no “more than the predictable use of prior art elements according to their established functions.” *KSR*, 550 U.S. at 417.

An obviousness analysis must articulate reasons why “there was an apparent reason to combine to combine the known elements in the fashion claimed by the patent at issue.” *Id.* at 418.

ANALYSIS

Rejections I-III & V

The Examiner’s position is based on the belief that the term “bonded” (e.g., the recitation “a support frame composed of an electrically and thermally conductive material bonded to a back face of the [electrode] plate” in claim 1) reads on the mere contact of electrode body (4) with upper electrode (7) in Takao by the clamping action of insulation ring (11) and sealed ring (12) (Ans. 16; FF 3 and 4). We cannot agree.

While it is inappropriate to limit a claim to preferred embodiments disclosed in the accompanying specification, the claim construction must be reasonable in light of the totality of the written description. *Baker Hughes*, 215 F.3d at 1303.

In this case, the ‘456 Patent discusses the term “bonded” only in the context of its plain meaning (bonding in the engineering or technical sense, i.e., fusion or integration of two separate materials into a single body) (FF 1

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

and 2). Furthermore, the Examiner's relied upon reasoning does not sufficiently demonstrate that persons skilled in the art would have used the term "bonded" in an unconventional manner to include mere physical contact by action of clamping (FF 4).

Under these circumstances, the Examiner erred in construing the term "bonded" to read on mere contacting provided by a clamping action, as disclosed in Takao. Accordingly, we cannot affirm any of the rejections based on this erroneous claim construction.

Rejection IV

We also cannot agree with the Examiner's conclusion that a person having ordinary skill in the art would have been led to combine Takao with Shigeru to arrive at the subject matter of the rejected claims. Takao describes an etching apparatus in which electrode body (4) anodized with Al is electrically connected to an upper electrode (7) made of amorphous carbon with holes (10) (FF 3 and 5). In stark contrast, Shigeru teaches the bonding of a target plate made of silicon dioxide (1) to copper (3) on which is deposited indium (2) using a thin film layer such as gold (FF 6). The Examiner, however, has not explained how or why a person having ordinary skill in the art would have had a reasonable expectation that the technique described for bonding Shigeru's silicon dioxide sputtering target to indium/copper would work in Takao's etching apparatus in which an amorphous carbon electrode (7) with holes is electrically connected to an electrode body (4) with anodized aluminum. *KSR*, 550 U.S. at 417. Hence,

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

the Examiner has not articulated an acceptable reason for combining the references, and, therefore, we cannot affirm. *KSR*, 550 U.S. at 418.

Rejections VI & VII

We also agree with Appellants that the Examiner's rejection of the rejected claims based principally on Takao and Yamada is similarly not well founded. Like Shigeru, Yamada teaches bonding a sputtering target to an annular projection of a fixing member using a solder material such as gallium and indium (FF 7). In stark contrast, Takao describes an etching apparatus in which electrode body (4) anodized with Al is electrically connected to an upper electrode (7) made of amorphous carbon with holes (10) (FF 3 and 5). The Examiner, however, has not explained how or why a person having ordinary skill in the art would have had a reasonable expectation that the technique described for bonding Yamada's target to an annular projection of a fixing member would work in Takao's etching apparatus in which an amorphous carbon electrode (7) with holes is electrically connected to an electrode body (4) with anodized aluminum. *KSR*, 550 U.S. at 417. Hence, the Examiner has not articulated an acceptable reason for combining the references, and, therefore, we cannot affirm. *KSR*, 550 U.S. at 418.

Rejection VIII

With respect to claim 33, the Examiner alleges that the claimed characteristic ("allowing the bonded assembly to return to room temperature, whereby the differential contraction [between the support ring and the

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

electrode plate] imparts the desired stress”) would be inherent in Shigeru (Ans. 49). As pointed out by Appellants, however, this finding is based on speculation, not fact (App. Br. 104). Because Yamada has not been shown to cure the deficiency in the Examiner’s rejection, we cannot affirm the Examiner’s rejection based on a combination of Shigeru and Yamada.

CONCLUSION

On this record, Appellants have shown reversible error in:

the Examiner’s conclusion that the term “bonded” as recited in claims 1 and 18 read on mechanical clamping or fastening;

the Examiner’s obviousness conclusion as to claim 7 because the Examiner did not sufficiently establish that a person having ordinary skill in the art would have reasonably expected the proposed modification of Takao in view of Shigeru to result in an operable device;

the Examiner’s obviousness conclusion as to claim 10 because the Examiner failed to sufficiently establish that a person having ordinary skill in the art would have had a reasonable expectation of success in modifying Takao by using Yamada’s bonding layer to affix Takao’s electrode (7) to body or frame (4); and

the Examiner’s obviousness conclusion as to claim 33 because the Examiner’s reasoning is based on speculation, not facts.

DECISION

The Examiner’s rejection of:

Appeal 2008-003131

Reissue Application 10/734,073

Reexamination Controls 90/007,027 and 90/007,114

Patent 5,074,456

- I. Claims 1, 3-5, 16-19, 30, and 31 under 35 U.S.C. § 102(b) as anticipated by Takao;
- II. Claim 2 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Koch;
- III. Claims 6 and 20 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Okazaki;
- IV. Claim 7, 21, and 32 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Shigeru;
- V. Claims 8, 9, 22, and 23 under 35 U.S.C. § 103(a) as unpatentable over Takao;
- VI. Claims 10-13 and 24-27 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao and Yamada;
- VII. Claims 14, 15, 28, and 29 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Takao, Yamada, and Shigeru; and
- VIII. Claims 33-36 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Shigeru and Yamada

are REVERSED.

Judgment reversing Rejections I-VIII is hereby entered in each of Reissue Application 10/734,073, Reexamination Control 90/007,027, and Reexamination Control 90/007,114.

REVERSED

Appeal 2008-003131
Reissue Application 10/734,073
Reexamination Controls 90/007,027 and 90/007,114
Patent 5,074,456

MAT

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